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## APPARATUS FOR TREATING IMAGES



## BACKGROUND OF THE INVENTION AND RELATED ART STATEMENT

The present invention relates to an apparatus for treating images on respective pages, particularly to an apparatus for treating images by combining data of the images to a data of a composite image including the images.

In a prior art copy machine, for forming a composite image by printing a plurality of images on one copy sheet, the images on sheets arranged on a scanner of the copy machine are read respectively to print the images on the one copy sheet, or the sheets are supplied to the scanner one-sheet by one-sheet to read the images on the sheets respectively so that the images are printed on the one copy sheet.

## 15 OBJECT AND SUMMARY OF THE INVENTION

An object of the present invention is to provide an apparatus for treating images by combining datas of the images to a data of a composite image including the images, by which apparatus, contents of the composite image can be easily edited, and/or an arrangement of the images in the composite image formed by combining the images of various sizes or dimensions can be easily and appropriately determined.

An apparatus for treating images by combining

datas of the images to a data of a composite image including the images, according to the present invention, comprises, an image recording device for storing respective datas of the images, and an image  
5 combining device for combining the datas of the images input from the image recording device to the data of the composite image including the images, and outputting the data of the composite image.

Since the image combining device combines the  
10 datas of the images input from the image recording device to the data of the composite image including the images, contents of the composite image (an arrangement of the images in the composite image) can be easily edited, and/or an arrangement of the images in the  
15 composite image formed by combining the images of various sizes or dimensions can be easily and appropriately determined.

It is preferable for editing easily the contents of the composite image (the arrangement of the  
20 images in the composite image) and/or determining easily and appropriately the arrangement of the images in the composite image formed by combining the images of various sizes or dimensions that the datas independent of each other are stored in the image  
25 recording device.

It is preferable for editing easily the contents of the composite image and/or determining easily and appropriately the arrangement of the images

in the composite image formed by combining the images of various sizes or dimensions that an information for identifying a turn number of each of the datas of the images stored in the image recording device in an order is attached to the each of the data of the images. The datas of the images may be taken into and stored by the image recording device, one data by one data. The images may be read to be converted to the datas of the images, one image by one image. The information for identifying the turn number of the each of the datas of the images in the order, in which order the datas of the images are taken into the image recording device, may be attached to the each of the datas of the images. The information for identifying the turn number of the each of the datas of the images in the order, in which order the images are read to be converted to the datas of the images, may be attached to the each of the datas of the images. The turn numbers of the datas may be desirably set to form the order. The turn number attached to the data may be changeable. The information for identifying the turn number of the each of the datas may be included by the each of the datas (as, for example, a file name of the each of the datas). The informations for identifying the turn numbers of a plurality of the datas may correspond to respective codes for identifying recording areas for storing respectively the plurality of the datas (by, for example, setting in the image recording device or in a

controller outside of the image recording device,  
relationships between addresses of the recording  
(memory) areas for storing respectively the plurality  
of the datas in the image recording device and the turn  
5 numbers of the plurality of the datas).

At least one of the datas of the images  
stored in the image recording device may be selectively  
removable. At least one of the datas of the images  
stored in the image recording device may be replaceable  
10 by a data of another image which is newly read. A  
content of at least one of the datas of the images  
stored in the image recording device may be changeable.

The image combining device may combine the  
datas of the images to the data of the composite image  
15 in such a manner that the images are arranged on the  
composite image in accordance with the order. The  
image combining device may combine the datas of the  
images to the data of the composite image in such a  
manner that the images are arranged on the composite  
20 image in accordance with the changed order including  
the changed turn number.

The apparatus may further comprise an image  
input device for reading each of the images to be  
converted to the data of the image, wherein the image  
25 input device includes picture elements, each of which  
picture elements reads a part of the each of the images  
to be converted to a part of the data of the image, and  
an area of the part of the each of the images to be

read by each of the picture elements is changeable.

The area of the part of the each of the images to be read by the each of the picture elements may be changed in accordance with a dimension of the each of the

5 images to be read.

The apparatus may further comprise a printing device for printing the composite image on a work-piece on the basis of the data of the composite image, wherein the area of the part of the each of the images to be  
10 read by the each of the picture elements is changed in accordance with at least one of a dimension of the composite image to be printed and a dimension of the each of the images to be read so that the images are included by the composite image.

15 The image combining device may combine the datas of the images to the data of the composite image including the images in such a manner that side edges of the images adjacent to each other are aligned along an imaginary straight line on the composite image. The  
20 image combining device may combine the datas of the images to the data of the composite image including the images in such a manner that side edges of the images adjacent to each other face to each other and are parallel to each other on the composite image. The  
25 image combining device may combine the datas of the images to the data of the composite image including the images in such a manner that side edges of the images adjacent to each other contact each other. The image

combining device may combine the datas of the images to the data of the composite image including the images in such a manner that two side edges of each of the four images adjacent to each other extend close to and  
5 parallel to respective two imaginary straight lines perpendicular to each other (that is, along the two imaginary straight lines perpendicular to each other) on the composite image.

The image combining device may combine the  
10 datas of the images to the data of the composite image including the images while a data corresponding to a part of at least one of the images is deleted to prevent the part of at least one of the images from being included by the composite image.

15 The apparatus may further comprise a printing device for printing the composite image on a work-piece on the basis of the data of the composite image while feeding the work-piece in a printing direction, wherein the image combining device combines the datas of the  
20 images to the data of the composite image in such a manner that the images are arranged along the printing direction in accordance with the order or the changed order including the changed turn number on the composite image. The image combining device may combine  
25 the datas of the images to the data of the composite image such that the images are arranged along a direction perpendicular to the printing direction in accordance with the order or the changed order

including the changed turn number on the composite image.

An image treating device according to the invention is constructed to read the images to input  
5 the datas of the images, to record the input datas of the images, to convert the recorded datas of the images compositely to an image data for printing an continuous arrangement thereof, to print the compositely converted image datas on a continuous printing medium, and to  
10 edit the recorded datas of the images to print as a second time on the printing medium.

According to the invention, by printing the continuos arrangement of the recorded datas of the images read from manuscripts, editing the data of the  
15 image corresponding to unsatisfactory one of the printed images, and printing as a second time on the printing medium, the whole printed image can be easily adjusted.

The image treating device has an image input  
20 device for reading the images to input the datas of the images, an image recording device for recording the input datas of the images, an image combining device for converting compositely the recorded datas of the images to the image data for printing the continuous  
25 arrangement thereof, an image printing device for printing the compositely converted image datas on the continuous printing medium, and an image editing device for editing the datas of the images recorded by the

image recording device, so that the whole printed image  
can be easily adjusted by printing the continuos  
arrangement of the recorded datas of the images read  
from manuscripts, editing the data of the image  
5 corresponding to unsatisfactory one of the printed  
images, and printing as a second time on the printing  
medium.

The image editing device may replace desired  
one of the datas of the images recorded in the image  
10 recording device by another image data, so that if a  
printed image read from a manuscript is unsatisfactory,  
a satisfactory image can be obtained by substituting  
therefor the another image data read again from the  
manuscript corresponding to the unsatisfactory printed  
15 image.

The image editing device may insert a data of  
another image to a desired position between the datas  
of the images recorded by the image recording device,  
so that a manuscript failed to be read by any reason is  
20 read, and a data of the read image is inserted to a  
lacked position to obtain a desired composite image.

The image editing device may delete desired  
one of the datas of the images recorded by the image  
recording device, so that an unnecessary image is  
25 deleted from the composite image to obtain the desired  
composite image without reading again all of the images.

The image treating device according to the  
invention has the image input device for reading the



manuscripts to input the datas of the images, the image recording device for recording the input datas of the images, and the image combining device for converting compositely the recorded datas of the images to the  
5 image data for printing the continuous arrangement thereof. According to the invention, since, the manuscripts can be arranged appropriately and the arrangement of the manuscripts can be understood easily.

Since the continuous arrangement of the  
10 manuscripts can be continuously output even if the manuscripts have non-standard sizes or respective sizes different from each other, by the image treating device having the image input device for reading the manuscripts to input the datas of the images, the image  
15 recording device for recording the input datas of the images, and the image combining device for converting compositely the recorded datas of the images to the image data for printing the continuous arrangement thereof, the appropriate arrangement of the manuscripts  
20 can be output, and be printed out by a printer.

The image input device may input the datas of the images expanded or contracted according to the size or dimensions of the manuscripts to be converted to the data of the image for printing the whole of each of the  
25 manuscripts by an arrangement with the expansion or reduction according to the size or dimensions of the manuscripts to be read.

By the image treating device having the image

recording device for recording the datas of the images  
supplied from a data source, and the image combining  
device for converting compositely the recorded datas of  
the images to the image data for printing the con-  
5 tinuous arrangement thereof, the continuous arrangement  
of the images can be output even if the images supplied  
from the data source have non-standard sizes or  
respective sizes different from each other.

The image treating device may further has a  
10 printing device for printing on a continuous printing  
medium the image data after conversion, so that the  
continuous arrangement of the images can be printed on  
the printing medium and the appropriate arrangement of  
the manuscripts is output.

#### 15 BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing an image  
treating apparatus in an embodiment form of the  
invention.

Fig. 2 is a flow chart of treatment in the  
20 image treating apparatus shown in Fig. 1.

Fig. 3 is an explanation view showing that a  
desired one of datas of images included by an image  
data of a composite image is replaced by another image  
data.

25 Fig. 4 is an explanation view showing that a  
desired one of datas of images, included by an image  
data of a composite image with two juxtaposed image-

arrays in a transverse direction, is replaced by another image data.

Fig. 5 is an explanation view showing that another data image is introduced to a desired position between datas of images included by an image data of a composite image with two juxtaposed image-arrays in a transverse direction.

Fig. 6 is an explanation view showing that a desired one of datas of images included by an image data of a composite image with two juxtaposed image-arrays in a transverse direction, is deleted.

Fig. 7 is a block diagram showing an image treating apparatus in an embodiment form of the invention.

Fig. 8 is a flow chart of treatment in the image treating apparatus shown in Fig. 7.

Fig. 9 is an explanation view showing a relationship between manuscripts to be read by an image input device and an image to be printed by an image printing device.

Fig. 10 is an explanation view showing another relationship between the manuscripts to be read by the image input device and the image to be printed by the image printing device.

Fig. 11 is a view showing another form of the image for the manuscripts as shown in Fig. 10.

Fig. 12 is an explanation view showing another relationship between the manuscripts to be read

by the image input device and the image to be printed  
by the image printing device.

#### DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

As shown in Fig. 1, an image treating  
5 apparatus of the invention has an image input device 1  
for reading manuscripts to input datas of images, an  
image recording device 2 for storing the datas of the  
images input by the image input device 1, an image  
combining device 3 for combining the recorded datas of  
10 the images to a data of a composite image including the  
images, an image printing device 4 for printing out the  
datas of the images treated by the image combining  
device 3 onto a printing medium, and an image editing  
device 5 for controlling how to combine the datas of  
15 the images recorded by the image recording device 2 at  
the image combining device 3.

The image input device 1 has a manuscript  
width detector 6 for detecting a width of the image or  
manuscript to be read, a parameter selector 7 for  
20 selecting a parameter to order an arrangement form of  
the output images on the printing medium or the  
composite image, a magnification determining device 8  
for determining a magnification on reading the image  
(corresponding to a ratio between a number of image-  
25 reader picture-elements for converting the image to be  
read to an image data and a width of the image to be  
read, a ratio between the number of image-reader

picture-elements and a width of a printed image corresponding to the images to be read may be fixed) on the basis of detection result of the manuscript width detector 6 and selection result of the parameter selector 7, and an image reader 9 for reading the manuscript or image to be read at the magnification determined by the magnification determining device 8. The magnification determining device 8 calculates the magnification on reading the manuscript or image at the image reader 9 on the basis of the width of the image or manuscript detected by the manuscript width detector 6, and a size of the printing medium and the arrangement form of the output images on the printing medium ordered by the parameter selector 7. For example, when the width of the manuscript is 297 mm, the size (width) of the printing medium is 210 mm and the arrangement form of the output images is two juxtaposed image-arrays in a transverse direction, the magnification on reading the manuscript or image is about 35%. By the image input device 1 as described above, the data of the image expanded or contracted at the magnification on reading the manuscript or image as determined by the magnification determining device 8 on the basis of the size or dimension of each of the manuscripts detected by the manuscript width detector 6 is input.

The image recording device 2 stores therein the datas of the images input by the image input device 1 to be treated by the image combining device 3. In

this case, the datas of the images in an order in which the datas of the images are input by the image input device 1 is recorded by the image recording device 2.

The image combining device 3 combines the  
5 recorded datas of the images to the data of the composite image for printing the continuous arrangement of the images on the printing medium. In this case, the printing medium is a continuously rolled paper.

The image editing device 5 controls how the  
10 image combining device 3 combines the recorded datas of the images to the data of the composite image to edit the data of the composite image while determining the arrangement of the images in the composite image by, replacing and/or deleting the data of the image  
15 recorded by the image recording device 2, selecting the datas of the images to be fed from the image recording device 2 to the image combining device 3, determining an order in which the datas of the images are fed from the image recording device 2 to the image combining  
20 device 3, inserting another image data between datas of the images, and/or adding the another image data, on the basis of the detection result of the manuscript width detector 6 and/or the selection result of the parameter selector 7, that is, a condition of the image  
25 to be read and a desired composite image.

In an operation of the image treating apparatus, as a start, after the manuscript is set on the image input device 1, parameters (a size of a

rolled paper, a reading density, an output image arrangement, each edit mode of replacement, insertion and addition, a page to be edited or the like) are set on an operation panel of the image treating apparatus  
5 (S100), and a start-key of the image treating apparatus is pushed down (S101).

After the image input device 1 checks as to whether the manuscript has been set to confirm that the manuscript has been set (S102), the width of the  
10 manuscript is detected by the manuscript width detector 6 (S103). The parameter selector 7 detects the previously instructed parameters (S104), and the magnification on reading the manuscript is determined by the magnification determining device 8 in accordance  
15 with the width of each of the manuscripts detected by the manuscript width detector 6 (S105). Incidentally, in this embodiment, since all of the manuscripts have the same width and the printing is performed on the rolled paper of the same width of these manuscripts,  
20 the magnification on reading the manuscripts is constantly 100%.

The manuscript is read by the image reader 9 according to the magnification on reading the manuscripts determined by the magnification determining  
25 device 8 to input the data of the image (S106). When the edit mode is the addition mode, decisions at steps S107 and S108 are "No", and at step S109, the input data of the image is additionally stored as the last

page in the datas of the images recorded in the image recording device 2. Thereafter, the manuscript is set again on the image input device and the parameters are set (S100), and the start-key is pushed down to read  
5 subsequent one of the manuscripts so that the treating is repeated. When the edit mode is the addition mode, the manuscripts are read to be input in an order by the image input device so that the datas of the images are respectively stored in the image recording device 2.

10 When the start-key is pushed down while the manuscript is not set, it is decided that all of the manuscript images have been completely input (S102). Subsequently, the datas of the manuscript images recorded by the image recording device 2 are taken out  
15 successively (S113), and are combined compositely to the data of the image by the image combining device 3 to be printed on the printing medium. Since single image array in the traverse direction is arranged in an example shown in Fig. 3, the datas of the images are  
20 printed on the rolled paper by the image printing device without specific composite treatment. Further, subsequent one of the datas of the images is taken out (S113), and arranged onto a next step in a rolled direction of the rolled paper (vertical direction in  
25 Fig. 3) in the order so that all of the images are completely printed (S116).

If one of the images (11)-(14) printed on the rolled paper is unsatisfactory in printing quality, the



data of the image corresponding to the unsatisfactory one is edited by the image editing device 5. The manuscript corresponding to the unsatisfactory image (13) is set onto the image input device 1, and the parameter is set on the operation panel so that the edit mode is set to the replacement mode (S100). When the start-key is pushed down (S101), steps S102-S106 are performed, it is checked that the edit mode is the replacement mode (S107), and replacing steps (S110, S111) are performed.

The image editing device 5 deletes the image (13) of the page to be replaced from the datas of the images recorded in the image recording device 2 (S110), and introduces an image (13) substituting for the deleted image to the page (S111). Thereafter, the datas of the images are combined again by the image combining device 3 through the steps of S100-S102 and S113-S116 to be printed onto the rolled paper, so that the printed image with the replaced image (13) is formed.

As described above, the continuous arrangement of the datas of the images recorded by reading the manuscripts is printed, the data of the image corresponding to the unsatisfactory-in-printing-quality one of the printed images is edited to be printed again on the printing medium, so that the printed composite image can be easily adjusted.

(second embodiment)

In the composite image shown in Fig. 4, a desired one image data in the datas of the images included by the data of the composite image with two image arrays in the transverse direction is replaced by another image data. Ten manuscripts are read through the steps S100-S109 to be recorded in the image recording device 2, similarly to the first embodiment. Since all of the manuscripts have the same width and the two image arrays in the transverse direction are printed on the rolled paper of the same width with the manuscripts, the magnification on reading the manuscripts is constantly 50%. In this case, the widths of the two image arrays in the transverse direction are equal to each other.

After all of the manuscript images are completely input, the datas for two images recorded in the image recording device 2 are output (S113), and are combined compositely to the data of the image to be printed on the printing medium by the image printing device 3 (S114). As shown in Fig. 4, the datas for two images recorded in the image recording device 2 are combined to be arranged in the order from left to right, and the data of the composite image is printed on the rolled paper by the image printing device 4 (S115).

The datas for further two images are output (S113), and arranged onto a next stage in the rolled direction of the rolled paper in the order. Gaps A, B, C and D are formed between the stages of the images to

make positions of upper edges of the images juxtaposed in the transverse direction equal to each other if the two manuscripts to be juxtaposed in the transverse direction are different from each other in length, and  
5 all of the images are completely printed.

If one of the images (11)-(20) printed on the rolled paper is unsatisfactory in printing quality, the operation mode is set to the replacement mode, and the steps S100, S101-S107 and S110-S111 are performed so  
10 that the data of the image corresponding to the image (18) of the page to be replaced in the datas of the images recorded in the image recording device is edited by the image editing device 5. Thereafter, the datas of the images are printed on the rolled paper through  
15 the steps S100-S102 and S113-S116, so that the printed image in which the image (18) is replaced is obtained.

As described above, the datas of the images recorded by reading the manuscripts are combined to the data of the composite image including the continuous  
20 arrangement in the plurality of the image arrays, and the manuscript corresponding to the image in the composite image unsatisfactory in printing quality is read again to obtain a data of an image to be substituted for the image unsatisfactory in printing  
25 quality, so that the printing quality is wholly adjusted easily.

(third embodiment)

In the composite image shown in Fig. 5,

another image is inserted to a desired position in the composite image including the two image arrays juxtaposed in the transverse direction. The another image is inserted between the image (11) and the image (22). In the composite image as a part (a) of Fig. 5, when the another image (18a) is inserted between the image (17) and the image (18), a manuscript of the another image (18a) is set on the image input device 1, and the parameter is set on the operation panel for the insertion mode as the edit mode. In response to the pushing down of the start key, as described above, the steps S102-S107 are performed, it is checked that the edit mode is the insertion mode (S108), and the insertion step (S112) is performed.

In the insertion step (S112), the another image (18a) is inserted to a desired position in the datas of the images recorded by the image recording device 2. The images (18)-(20) to be behind the inserted another image (18a) are carried down one by one. Thereafter, the datas of the images are combined again by the image combining device 3 through the steps S100-S102 and S113-S116 to be printed onto the rolled paper and output compositely as shown in a part (b) of Fig. 5. Clearances E and F between the images are automatically reformed.

As described above, only a manuscript failed to be read is read, and the read-in data of the image is inserted to the desired position to obtain a really

desired composite image. That is, only the image to be inserted is read to easily adjust wholly the printing quality without reading again all of the images.

(fourth embodiment)

5           In the composite image shown in Fig. 6, a desired data of an image included by the composite image with the two image arrays in the transverse direction is deleted. In the composite image as a part (a) of Fig. 6, when the image (18) between the image  
10 (17) and the image (19) is unnecessary, a page to be deleted is set on the operation panel (S100). In response to the pushing down of the start key, the data of the images (18) in the datas of the images recorded by the image recording device 2 is deleted by the image  
15 editing device. The images (19) and (20) to be behind the deleted image (18) are automatically carried up one by one. Thereafter, the datas of the images are combined again by the image combining device 3 through the steps S100-S102 and S113-S116 to be printed on the  
20 rolled paper and output compositely as shown in a part (b) of Fig. 6. The clearance G between the images is automatically reformed.

As described above, when the unnecessary image is included by the composite image, only the  
25 unnecessary image is deleted to obtain the really desired composite image. That is, only the unnecessary image is deleted to easily adjust wholly the printing quality without reading again all of the images.

An image treating apparatus shown in Fig.

7 has an image input device 101 for reading the manuscripts to input the datas of the images, an image recording device 102 for storing the datas of the  
5 images input by the image input device 101, an image combining device 103 for combining the recorded datas of the images to a data of a composite image, and an image printing device 104 for printing on the printing medium on the basis of the datas of the images treated  
10 by the image combining device 103.

The image input device 101 has a manuscript width detector 105 for detecting a width of the image or manuscript to be read, a parameter selector 106 for selecting a parameter to order an arrangement form of  
15 the images in the output composite image, a magnification determining device 107 for determining the magnification on reading the image on the basis of the detection result of the manuscript width detector 105 and the selection result of the parameter selector 106,  
20 and an image reader 108 for reading the manuscript or image to be read at the magnification determined by the magnification determining device 107. The manuscript width detector 105 detects the width of each of the manuscripts or images of non-standard sizes or  
25 different sizes to be read by the image reader 108. The parameter selector 106 orders the size of the printing medium output by the image printing device 104 or composite image printed thereby, and how the images

are output onto the printing medium or how the images are arranged on the composite image. The arrangement form of the images on the printing medium or the composite image ordered by the parameter selector 106 is described below.

The magnification determining device 107 calculates the magnification on reading the manuscript or image at the image reader 108 on the basis of the width of the image or manuscript detected by the manuscript width detector 105, and the size of the printing medium or composite image and the arrangement form of the images ordered by the parameter selector 6. For example, when the width of the manuscript is 297 mm, the size (width) of the printing medium is 210 mm and the arrangement form of the output images is two juxtaposed image-arrays in a transverse direction, the magnification on reading the manuscript or image is about 35%.

The image reader 108 reads the manuscript or image in accordance with the magnification on reading the manuscript as determined by the magnification determining device 107. By the image input device 101 as described above, the data of the image expanded or contracted at the magnification on reading the manuscript or image as determined by the magnification determining device 107 on the basis of the size or dimension of each of the manuscripts or images detected by the manuscript width detector 107 is input.

The image recording device 102 stores therein the datas of the images input by the image input device 101 to be treated by the image combining device 103. In this case, the datas of the images in an order in which the datas of the images are input by the image input device 101 are recorded by the image recording device 102. The image combining device 103 converts and combines the datas of the images recorded in the image recording device 102 to the data of the composite image including the image arrays arranged continuously by the image printing device 104. The image printing device 104 prints the composite image on the printing medium on the basis of the data of the composite image. In this case, the printing medium is the continuously rolled paper.

In the manuscripts (111)-(120) shown in a part (b) of Fig. 9, all of lateral widths (widths in a transverse direction of Fig. 9) are the same, but longitudinal lengths (lengths in a longitudinal direction of Fig. 9) are different from each other. Along a flow chart shown in Fig. 8, how these manuscripts (111)-(120) are arranged and printed out in two image arrays in the transverse direction onto the rolled paper as shown in a part (b) of Fig. 9 is explained. In this case, the rolled paper shown in the part (b) of Fig. 9 is rolled in the longitudinal direction in Fig. 9, and the width thereof in a perpendicular direction to the rolled direction (the



transverse direction in Fig. 9) is the same with the manuscripts (111)-(120).

As a start, after the manuscript is set on the image input device 101, parameters (the size of the rolled paper, the output image arrangement or the like) are set on the operation panel of the image treating apparatus (S1100), and the start-key of the image treating apparatus is pushed down (S1101). After the image input device 101 checks as to whether the manuscript has been set to confirm that the manuscript has been set (S1102), the width of the manuscript is detected by the manuscript width detector 105 (S1103). The parameter selector 106 detects the previously instructed parameters (S1104), and the magnification on reading the manuscript is determined by the magnification determining device 107 in accordance with the width of each of the manuscripts detected by the manuscript width detector 105 (S1105). Incidentally, in this embodiment, since all of the manuscripts (111)-(120) have the same width and the printing is performed in the two image arrays in the transverse direction on the rolled paper of the same width with these manuscripts (111)-(120), the magnification on reading the manuscripts or images is constantly 50%. In this case, widths of the two image arrays in the transverse direction are equal to each other.

The manuscript is read by the image reader 108 according to the magnification on reading the

manuscripts determined by the magnification determining device 107 to input the data of the image (S1106).

The input data of the image is stored in the image recording device 102 (S1107). Thereafter, the

5 manuscript is set again on the image input device 101 and the parameters are set (S1100), and the start-key is pushed down to read subsequent one of the manuscripts to input the data of the image (S1101). The manuscripts (111)-(120) are read to be input in an  
10 order by the image input device 101 so that the datas of the images are respectively stored in the image recording device 102.

When the start-key is pushed down while the manuscript is not set, it is decided that all of the  
15 manuscript images have been completely input (S1102). Subsequently, the datas of the manuscript images of two pages recorded by the image recording device 2 are taken out (S1108), and a formation of the data of the composite image is started by the image combining  
20 device 3 to be printed on the printing medium (S1109). As shown in the part (b) of Fig. 9, the datas of the manuscripts images stored in the image recording device 102 are combined in such a manner that the images of the two pages are arranged in order in the transverse  
25 direction on the composite image, and the data of the composite image of the combined images is fed to the image printing device 4 so that the composite image is printed out onto the rolled paper (S110).

Further, the datas of the images of  
subsequent two pages are taken out (S1108), and  
combined to subsequent part of the data of the  
composite image to be arranged in the order onto a  
5 subsequent stage in the rolled direction of the rolled  
paper. If the lengths of the manuscripts juxtaposed in  
the transverse direction are different from each other,  
clearances A, B, C and D are formed between the images  
of the juxtaposed stages to make positions of upper  
10 ends of the images juxtaposed in the transverse  
direction equal to each other, and the printing of all  
of the datas of the images are finished (S1111). By  
making the upper positions of the images equal to each  
other when printing, the manuscripts are prevented from  
15 being scattered even when the sizes of the manuscripts  
are different from each other, and the whole arrange-  
ment of the manuscripts can be easily known.

Incidentally, the image printing device 104  
may be separated from the image treating apparatus of  
20 the invention, so that the data of the composite image  
is output to a printer device or the like including the  
image printing device 4 to be printed. That is, the  
manuscript images are input from the image input device  
101 such as a scanner or the like connected to a  
25 computer or the like, and the image printing device 104  
such as the printer is connected to the computer to  
obtain operations and effects as described above.

The manuscripts (121)-(130) shown in Fig. 10

have non-standard-sizes different in width and length from each other. The width of each of the manuscripts (121)-(130) is detected by the manuscript width detector 105, and the magnification on reading the

5 manuscripts are determined by the magnification determining device 107 in such a manner that each of the manuscripts (121)-(130) is included by a half of the width of the rolled paper. The magnification on reading is determined on the basis of the widths of the

10 manuscripts (121)-(130), because the width of the rolled paper is constant, although the printing in the rolled direction of the rolled paper may be performed in accordance with the lengths of the manuscripts (121)-(130). Incidentally, in Fig. 10, as shown in Fig.

15 9, clearances E, F, G and H are formed between the images of the stages juxtaposed in the rolled direction of the rolled paper so that the positions of upper ends of the images juxtaposed in the transverse direction are equal to each other.

20 As described above, even when the manuscripts have non-standard sizes different from each other, the data of the image expanded or contracted in accordance with the width of each of the manuscripts (121)-(130) is input to arrange the images in such a manner that

25 the whole of each of the manuscripts is printed, so that the whole arrangement of the images can be easily known and the whole of each of the manuscripts can be confirmed.

In the composite image shown in Fig. 11, the magnification on reading is set constantly at 50% by the magnification determining device 7 irrespective of the width of the each of the manuscripts (121)-(130).

5 The images of the manuscripts (121)-(130) are arranged in such a manner that upper left ends of the manuscript images are set at a left end and a center of the rolled paper. In this case, vacant areas adjacent to right side of the manuscript images (shown by cross-hatching) and over-flow areas of the right side of the manuscript  
10 images (shown by hatching) are disregarded, and clearances are formed between the images of the stages juxtaposed in the rolled direction of the rolled paper. In this arrangement, the whole arrangement of the  
15 manuscripts can be known.

In the composite image shown in Fig. 12, when the images of the manuscripts (131)-(140) are arranged in the rolled direction of the rolled paper, it is not carried out that the positions of the upper ends of the  
20 images juxtaposed in the transverse direction are equal to each other as shown in a part (a) of Fig. 12, but the positions of the upper ends of the images and positions of lower ends of the images in each pair of the stages are made equal to each other as shown in a  
25 part (b) of Fig. 12. In the part (b) of Fig. 12, the images (131)-(134) of first and second stages are arranged close to each other, and the positions of the lower ends of the images (135)-(136) in third stage are

equal to each other.

By arranging the images in the each pair of the stages close to each other without making the positions of the lower or upper ends of the images  
5 (135)-(136) in each stage equal to each other, the clearances formed between the manuscripts of the respective stages are reduced, and an amount of the rolled to be used can be decreased.

Incidentally, although only the widths are  
10 detected by the manuscript width detector 105 to perform the adjustment on the basis of the widths in the embodiments of the invention, the adjustment may be performed with detecting not only the widths but also the sizes or dimensions of the manuscripts including  
15 the lengths of the manuscripts and so forth.

In another embodiment, the treatment may be performed on the basis of the datas of the images formed by using the computer without the image input device 101 of the above described embodiments. In this  
20 case, the datas of the images formed by using the computer are stored in a memory on the computer, the datas of the images fed from the data source such as the memory are recorded in the image recording device 102, and the treatment thereafter may be performed as  
25 the above described processes.

WHAT IS CLAIMED IS:

1. An apparatus for treating images by combining datas of the images to a data of a composite image including the images, comprising,  
an image recording device for storing the respective datas of the images, and  
an image combining device for combining the datas of the images input from the image recording device to the data of the composite image, and outputting the data of the composite image.
2. An apparatus according to claim 1, wherein the datas independent of each other are stored in the image recording device.
3. An apparatus according to claim 1, wherein an information for identifying a turn number of each of the datas of the images stored in the image recording device in an order is attached to the each of the data of the images.
4. An apparatus according to claim 1, wherein the datas of the images are taken into and stored by the image recording device, one data by one data.
5. An apparatus according to claim 1, wherein the images are read to be converted to the datas of the images, one image by one image.
6. An apparatus according to claim 3, wherein the information for identifying the turn number of the each of the datas of the images in the order, in which order the datas of the images are taken into the image

recording device, is attached to the each of the datas of the images.

7. An apparatus according to claim 3, wherein the information for identifying the turn number of the each of the datas of the images in the order, in which order the images are read to be converted to the datas of the images, is attached to the each of the datas of the images.

8. An apparatus according to claim 3, wherein the turn numbers of the datas are desirably set to form the order.

9. An apparatus according to claim 3, wherein the turn number attached to the data is changeable.

10. An apparatus according to claim 3, wherein the information for identifying the turn number of the each of the datas is included by the each of the datas.

11. An apparatus according to claim 3, wherein the informations for identifying the turn numbers of a plurality of the datas correspond to respective codes for identifying recording areas for storing respectively the plurality of the datas.

12. An apparatus according to claim 1, wherein at least one of the datas of the images stored in the image recording device is selectively removable.

13. An apparatus according to claim 1, wherein at least one of the datas of the images stored in the image recording device is replaceable by a data of another image which is newly read.



14. An apparatus according to claim 1, wherein a content of at least one of the datas of the images stored in the image recording device is changeable.

15. An apparatus according to claim 3, wherein the image combining device combines the datas of the images to the data of the composite image such that the images are arranged on the composite image in accordance with the order.

16. An apparatus according to claim 9, wherein the image combining device combines the datas of the images to the data of the composite image such that the images are arranged on the composite image in accordance with the changed order including the changed turn number.

17. An apparatus according to claim 1, further comprising an image input device for reading each of the images to be converted to the data of the image, wherein the image input device includes picture elements, each of which picture elements reads a part of the each of the images to be converted to a part of the data of the image, and an area of the part of the each of the images to be read by each of the picture elements is changeable.

18. An apparatus according to claim 17, wherein the area of the part of the each of the images to be read by the each of the picture elements is changed in accordance with a dimension of the each of the images to be read.

19. An apparatus according to claim 17, further comprising a printing device for printing the composite image on a work-piece on the basis of the data of the composite image, wherein the area of the part of the each of the images to be read by the each of the picture elements is changed in accordance with at least one of a dimension of the composite image to be printed and a dimension of the each of the images to be read so that the images are included by the composite image.

20. An apparatus according to claim 1, wherein the image combining device combines the datas of the images to the data of the composite image including the images in such a manner that side edges of the images adjacent to each other are aligned along an imaginary straight line on the composite image.

21. An apparatus according to claim 1, wherein the image combining device combines the datas of the images to the data of the composite image including the images in such a manner that side edges of the images adjacent to each other face to each other and are parallel to each other on the composite image.

22. An apparatus according to claim 1, wherein the image combining device combines the datas of the images to the data of the composite image including the images in such a manner that side edges of the images adjacent to each other contact each other.

23. An apparatus according to claim 1, wherein the image combining device combines the datas of the

images to the data of the composite image including the images in such a manner that two side edges of each of the four images adjacent to each other are close to and parallel to respective two imaginary straight lines perpendicular to each other on the composite image.

24. An apparatus according to claim 1, wherein the image combining device combines the datas of the images to the data of the composite image including the images while a data corresponding to a part of at least one of the images is deleted to prevent the part of at least one of the images from being included by the composite image.

25. An apparatus according to claim 3, further comprising a printing device for printing the composite image on a work-piece on the basis of the data of the composite image while feeding the work-piece in a printing direction, wherein the image combining device combines the datas of the images to the data of the composite image such that the images are arranged along the printing direction in accordance with the order on the composite image.

26. An apparatus according to claim 9, further comprising a printing device for printing the composite image on a work-piece on the basis of the data of the composite image while feeding the work-piece in a printing direction, wherein the image combining device combines the datas of the images to the data of the composite image such that the images are arranged along

the printing direction in accordance with the changed order including the changed turn number on the composite image.

27. An apparatus according to claim 3, further comprising a printing device for printing the composite image on a work-piece on the basis of the data of the composite image while feeding the work-piece in a printing direction, wherein the image combining device combines the datas of the images to the data of the composite image such that the images are arranged along a direction perpendicular to the printing direction in accordance with the order on the composite image.

28. An apparatus according to claim 9, further comprising a printing device for printing the composite image on a work-piece on the basis of the data of the composite image while feeding the work-piece in a printing direction, wherein the image combining device combines the datas of the images to the data of the composite image such that the images are arranged along a direction perpendicular to the printing direction in accordance with the changed order including the changed turn number on the composite image.

ABSTRACT OF THE DISCLOSURE

An apparatus for treating images by combining datas of the images to a data of a composite image including the images, has an image recording device for storing the respective datas of the images, and an image combining device for combining the datas of the images input from the image recording device to the data of the composite image, and outputting the data of the composite image.

FIG.1

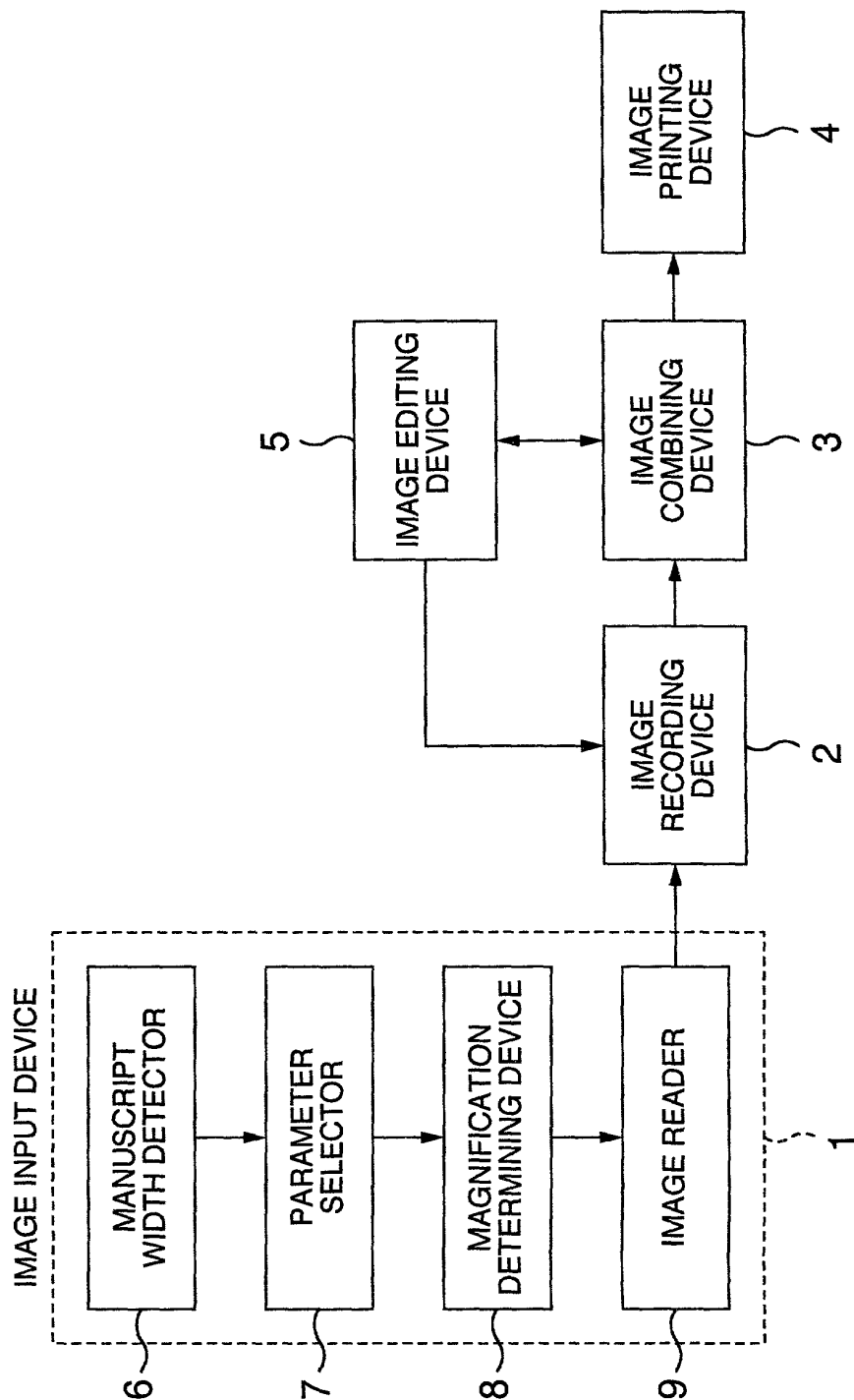


FIG.2

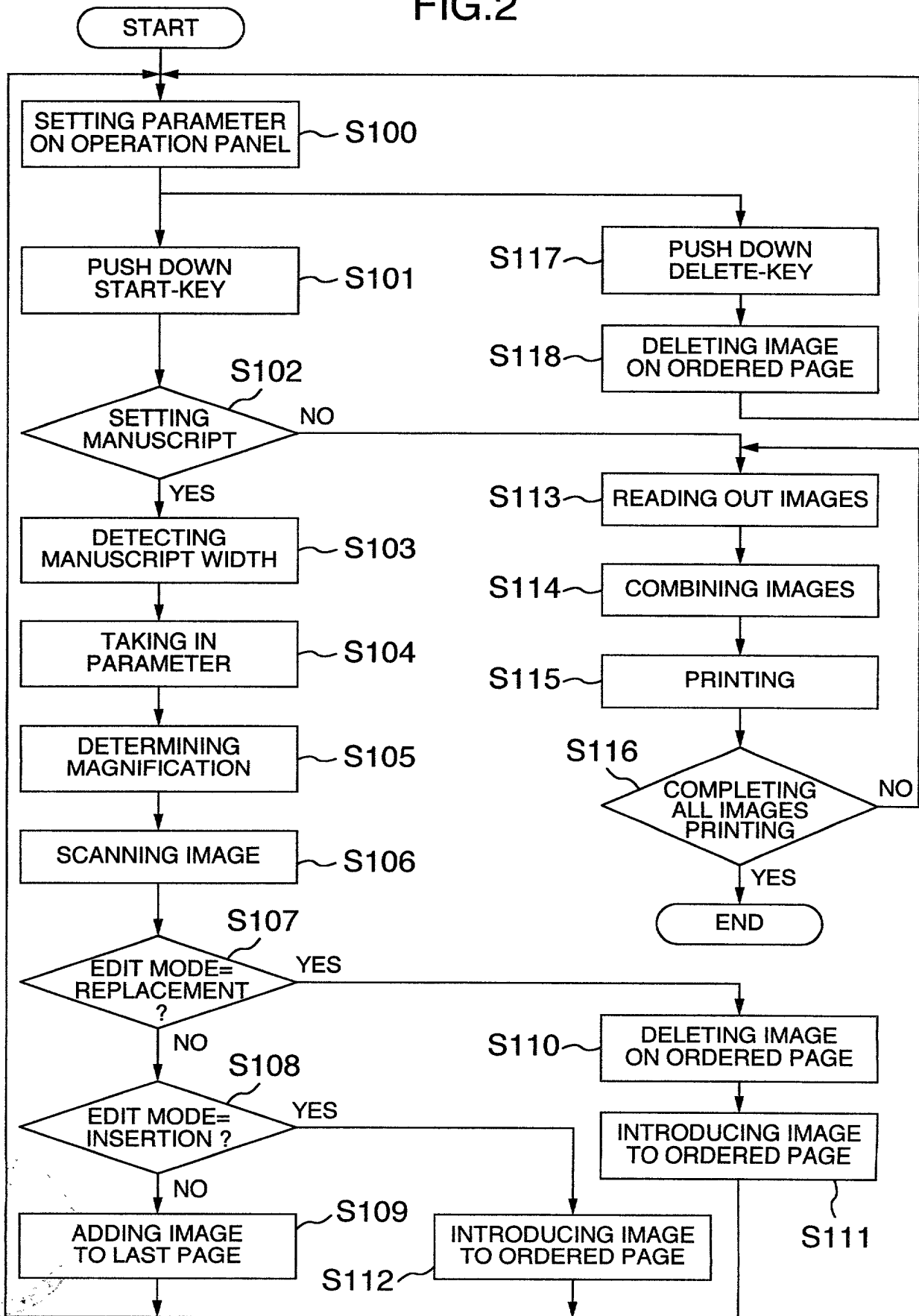


FIG.3

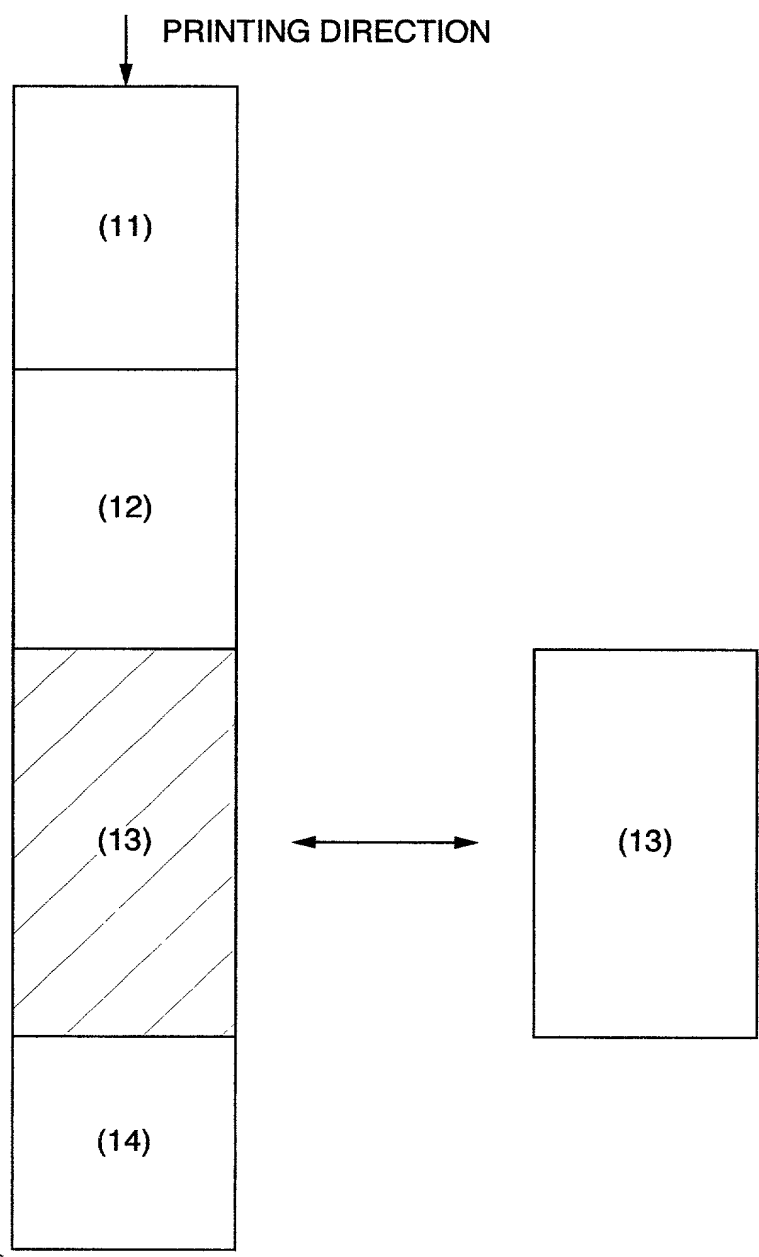
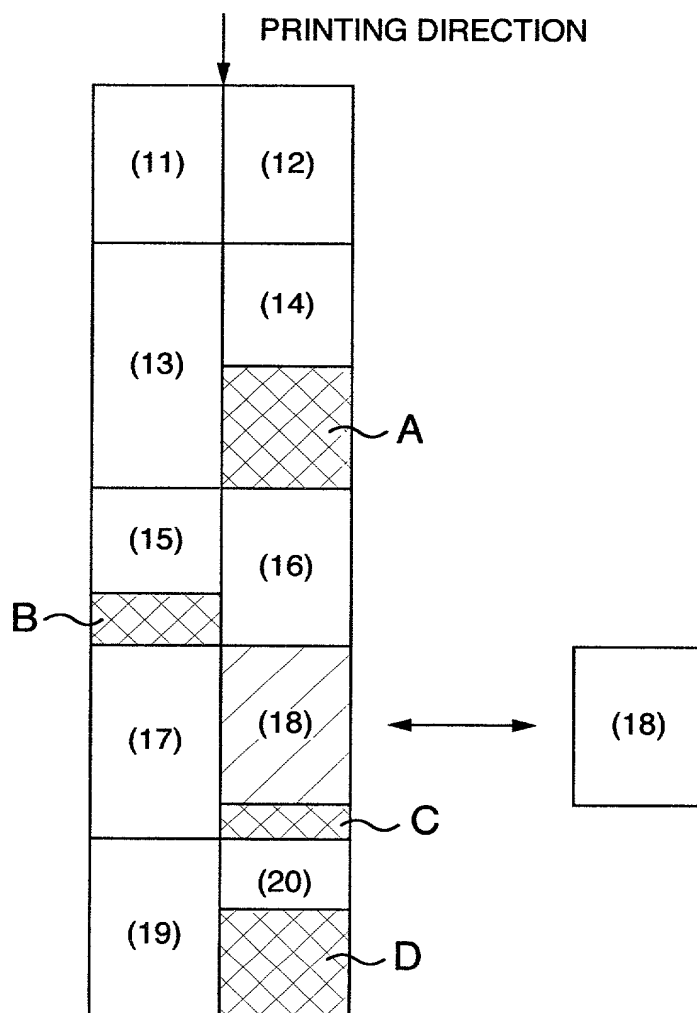
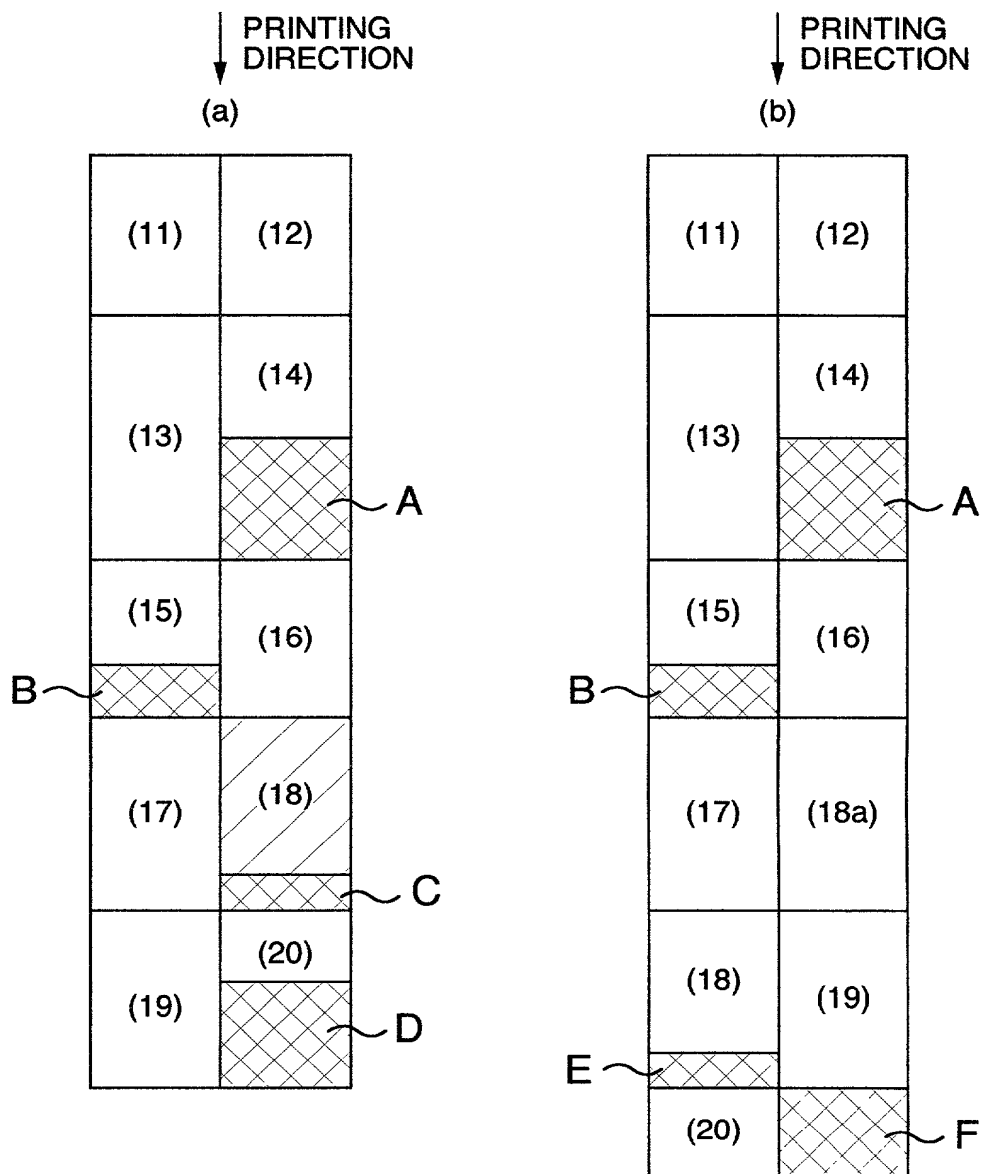




FIG.4



# FIG.5



# FIG.6

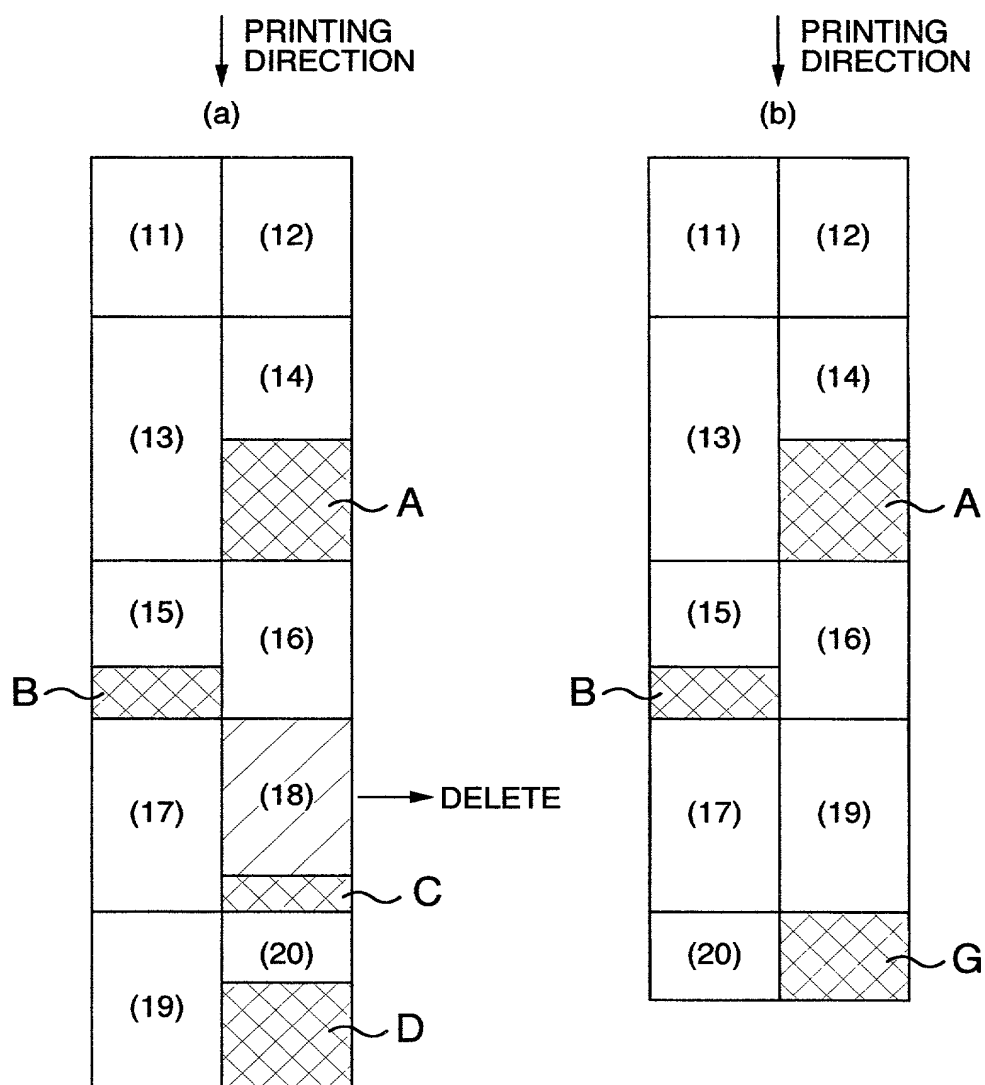
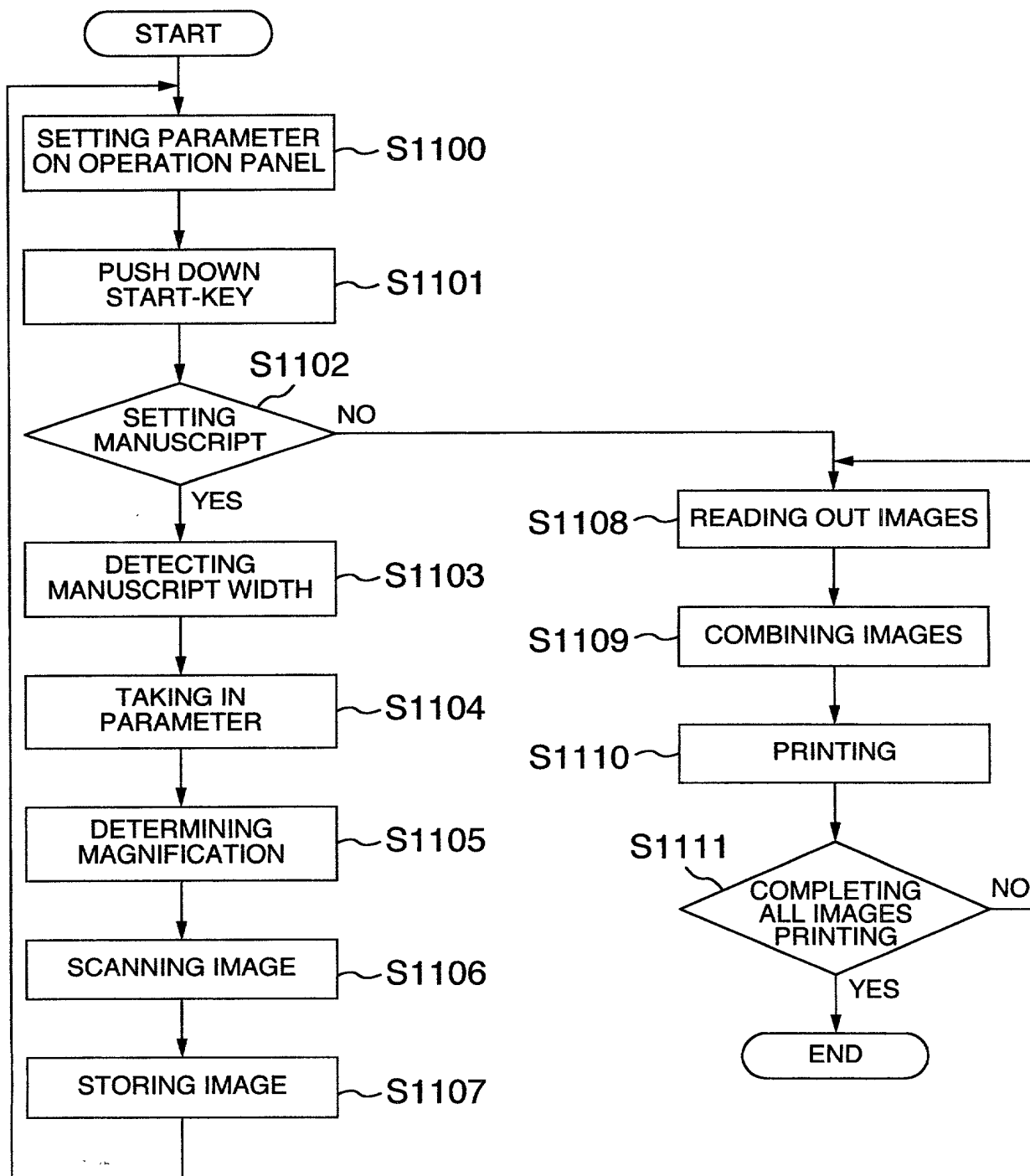
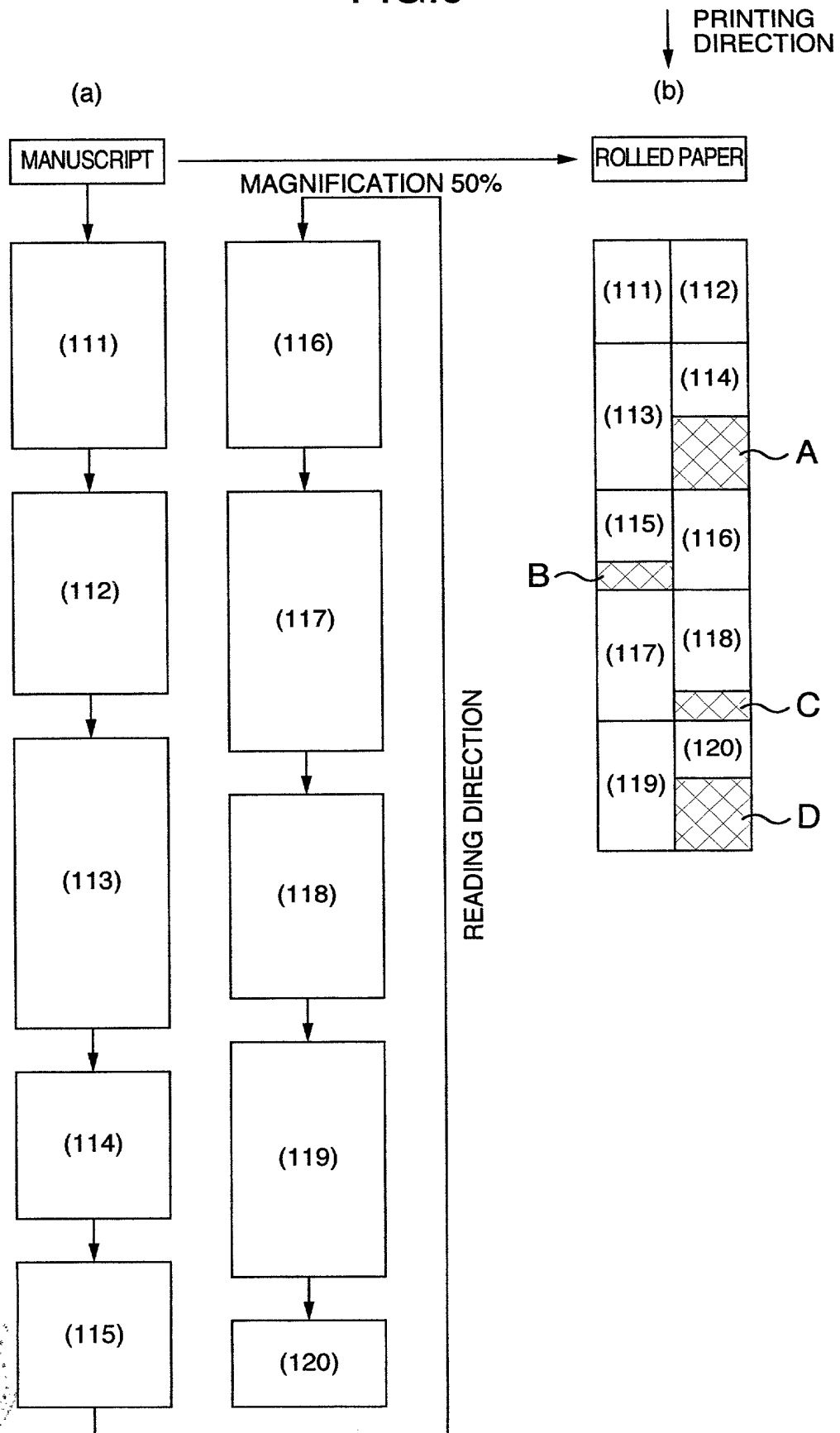




FIG.8



# FIG.9



# FIG.10

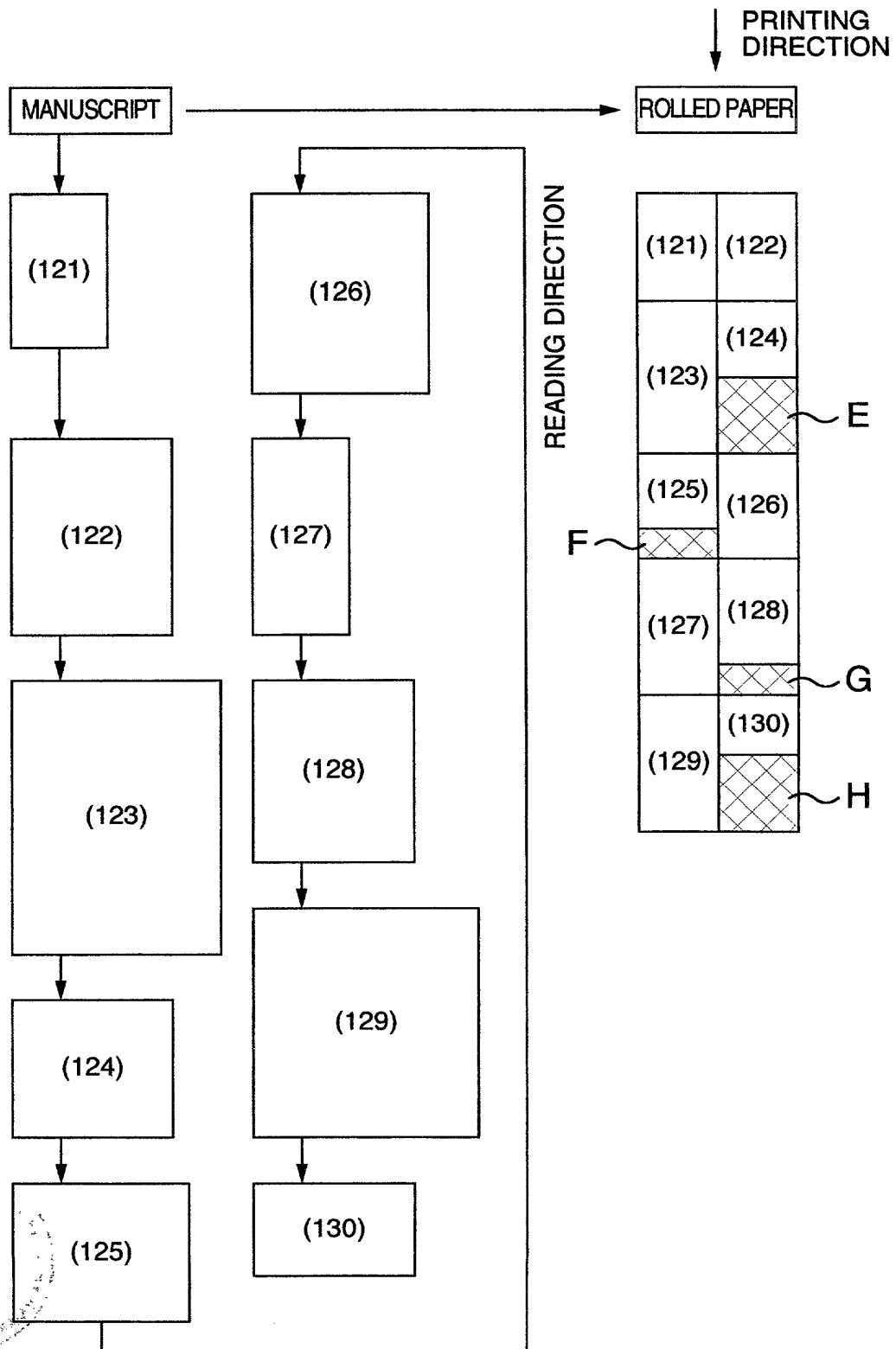


FIG.11

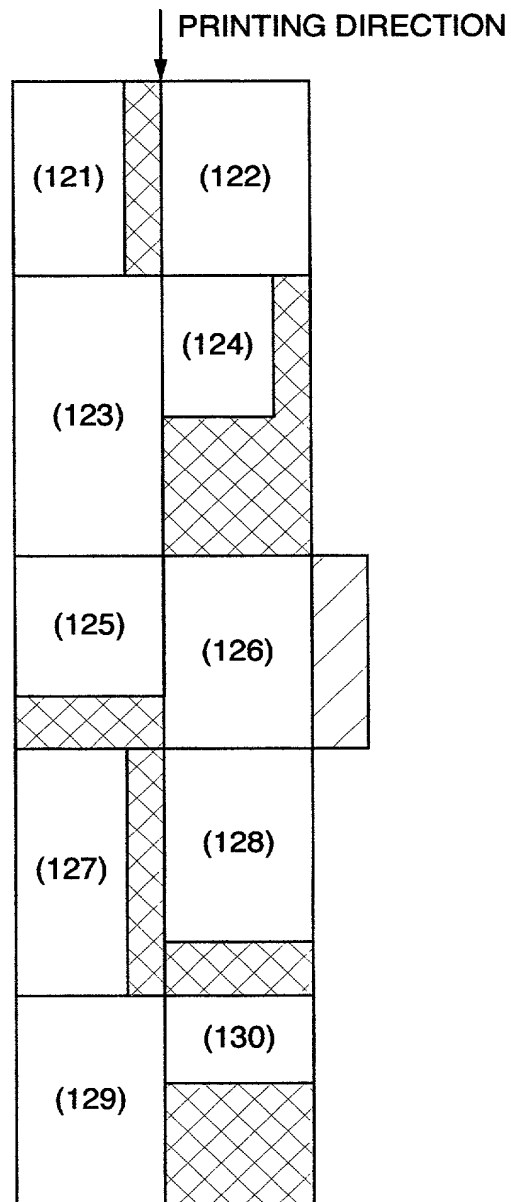




FIG.12

